Title: Money Matters

Brief Overview:

The students will learn to sort and graph coins so they can better understand that the number of coins is different than the value of coins. They will initially practice sorting the coins to make sure they can differentiate each of them. They will then learn to make a bar graph and count the amount of each type of coin. The students will make a second bar graph to reflect the value of the money a little boy has. The students will have to use skip counting to determine the value of the money the child has. They will recognize that the more coins do not necessarily mean more money.

The students will play Spin the Wheel to determine the probability of landing on a particular coin. They will keep a tally chart of the amount of chances it takes them to get to $1.00.

NCTM Content Standard/National Science Education Standard:

<u>Data Analysis and Probability Standard</u>

Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

- Pose questions and gather data about themselves and their surroundings
- Sort and classify objects according to their attributes and organize data about the objects
- Represent data using concrete objects, pictures, and graphs
- Design investigations to address a question and consider how data-collection methods affect the nature of the data set
- Collect data using observations, surveys, and experiments
- Represent data using tables and graphs such as line plots, bar graphs, and line graphs
- Recognize the differences in representing categorical and numerical data

Select and use appropriate statistical methods to analyze data.

- Describe parts of the data and the set of data as a whole to determine what the data show
- Use measures of center, focusing on the median, and understand what each does and does not indicate about the data set
- Compare different representations of the same data and evaluate how well each representation shows important aspects of the data

Understand and apply the basic concepts of probability.

- Describe events as likely or unlikely and discuss the degree of likelihood using such words as certain, equally likely and impossible
- Predict the probability of outcomes of simple experiments and test the predictions
- Understand that the measure of the likelihood of an event can be represented by a number from 0 to 1

Grade/Level:

2-3

Duration/Length:

3 days (60 minutes per day) and an assessment on the fourth day.

Student Outcomes:

Students will:

- Students will be able to identify the name and value of coins varying from quarters, dimes, nickels, and pennies.
- Students will collect data by sorting coins by coin names and coin values.
- Students will identify and locate vocabulary terms and placement on a bar graph.
- Students will display data on a bar graph.
- Students will interpret data displayed on a bar graph.

Materials and Resources:

- K-W-L chart template
- Poem "Smart" by Shel Silverstein
- Tally table template
- Blank bar graph grid paper template
- Markers
- Tape
- Student Resource 1 (homework)
- Math journals
- Money (dollar, quarters, dimes, nickels and pennies)
- Spinner
- Blank chart paper or transparencies
- Money placemat

Development/Procedures:

Lesson 1

Pre-assessment

- A K-W-L chart (Teacher Resource 1) is displayed in front of the students. The students are encouraged to tell what they know about a bar graph. *(Not much leading is taking place from the teacher because this is being used as an assessment. Accept all answers at this time.)* Write the responses of the students under the "K".
- Ask students what they want to know about "bar graphs" *(Write students' responses under the "W" on the chart. Accept all answers and write each student's name by responses)*.
- Draw the students' attention to the "L" section of the chart and say that as they learn throughout the lesson we will revisit and write what was learned.

Launch

- Read the poem, "Smart," by Shel Silverstein to the students.
- After the poem is read, asks the students who were the people in the story and instruct students to give the storyteller a name (*Make note that it is a boy because of the words in line 2)*.
- Say, "We are going to help the boy sort his coins by face value and coin worth." Have the students look at the pre-made tally table template (Teacher Resource 2 and note answers on Teacher Resource 3) and have students fill in the categories *(the names of the coins that the little boy received.)* and tally the amount of coins he traded per person and interacted with. ***Note you may want to consider writing the poem out on chart paper as an easy reference to refer back to with the students.***
- Say, "We could also display the coins he traded another way by using a bar graph.

Teacher Facilitation

- Say, "A bar graph is a way to display data using bars. Display a chart with a blank grid. (Teacher Resource 6).
- Say, "Each part of the bar graph has a name and purpose in order to interpret the data given on a bar graph." *(Point to the areas on the blank grid and explain each part. Talk through the meaning and purpose of each place to the students.)*
- Point to the top of the grid and say this is where we name the graph. We call this place the graph's title.
- Move your hand down the left side of the grid and say, "This area is called the vertical axis. This is where our numbers start from zero to tell us how many of something we are counting.
- Move your hand across the bottom of the grid and say, "This is called the horizontal axis where the names of the items we are graphing are placed.

(*At this time, comment that sometimes this information is changed in placement depending on who is creating the graph.)*

- Review the terms mentioned. Point and touch the places in the order that they were introduced and restate the name and purpose of each placement and word. (*The title names the graph. The vertical axis is where the numbers are written starting with zero. The horizontal axis is where the names of the information graphed is kept.)*
- Say to the students, "Those are big words to remember aren't they. Let's give some movement to each of these words to help us remember.
- Say the movement for the following:
    - Title: Move your hand in a circle over top of your head and mention that their head is at the top and so is the title of a graph.
    - Vertical axis is to the left of a graph. Move your left hand up and down the left side of your body.
    - Horizontal axis: move your right hand side to side in front of you
- Practice making the movements with the students
- Next state the following, "The vertical and horizontal axes have jobs". They have to hold the scale and the categories. The scale is the numbers that start at zero and go up the vertical axis. The categories go across the horizontal axis and name the information that we are graphing
    - Scale: use your left pointer finger and start low in front of you and then point one space at a time up the vertical axis.
    - Categories: use your right hand and move it across in front of you with an open and closed fist at a time while moving your hand one area at a time.
- Practice each movement again with the students.

Student Application

- After reviewing a couple of times, have the students call on one another to say a word and the student selected acts out the movement of the word
- Then the teacher makes a movement and selects a student to say which word is being acted out.
- On the bar graph grid, as a class, graph the amounts from the tally table template. (Answer key is on Teacher Resource 5)

Embedded Assessment

- Call on students to take turns placing the vocabulary words in their correct places on the blank grid.
- Review randomly the movements, words, and places of the terms to observe which students may need more time.
- Revisit the K-W-L chart to write under the "L'" any learned information

Reteaching/Extension

- Assign students a partner to practice in small group and meet with students who may be having difficulty.
- Distribute student handout and assign for homework.

Lesson 2

Pre-assessment

- Direct the students to refer back to the graph used on the prior day's lesson.
  As a warm-up ask the students to identify coins that equal $1.00. *(Write the students responses on a blank chart or transparency.)*

Launch

- Have the students reread the poem "Smart" with the teacher.
- Ask the students if the son made smart choices *(student responses should vary but show relationship to the poem i.e. made bad choices because all of his trades show less than a dollar.*)
- Ask the students to explain their answers.

Teacher Facilitation

- Distribute a bag of money to each pair of students.
- Have the students sort the money in a way that would help the son determine the amount of money he receives during each swap of the coins.
- Ask the students how they can change their bar graph to represent the value of the money that the son had each time he swapped the coins. *(Possible answers*: *count the money; skip count to find the answer.)*
- Determine how the scale will change to give an appropriate representation of the value (*Ask if it would be more practical to count the value by 1's, 5's, 10's or 25's*).
- Change the horizontal axis to represent the names of the people the boy interacted with *change. (Lou, Bates, and Hiram Combs)* ***Note: the boy's first trade is unknown but you may want label it as someone different for graphing purposes.***
- Distribute blank grid template and have each pair of students graph the information discussed. (Student Resource 5) and (Teacher Resource 6)
- Introduce vocabulary that students will need to interpret the new bar graph. (**More than, less than, total amount, equal**)
- Discuss how this graph helps them to see when the son had the most or least amount of money.

Student Application

- Have the students count the amount of money that the son had each time.
- Determine if the student had more than, less than, or an equal amount of money each time.

Embedded Assessment

- Have students take out their math journals.
- Answer the following question: "How does the new graph help you understand how much money he has*?" (Student responses should reflect understanding of interpreting the graph and proper use of new vocabulary. Encourage students to use drawings in their explanations.)*

Reteaching/Extension

- Choose a station or center to practice sorting, graphing or interpreting information.
- Give the students a small bag with fruit loops in it for homework.
- Have the students sort the fruit loops by color and make a bar graph of the data on a bar graph template (Student Resource 5).

Lesson 3

Pre-assessment

- Have students work with partners to share their homework. *(Make observations as students share to assess student understanding and offer additional help if necessary.)*
- Have the students ask two questions to determine if the other students can interpret the data on their graphs.
- Randomly select students to share their homework with the class.

Launch

- Reread the poem "Smart".
- Tell the students that today they will determine how many coins are really needed to make $1.00.
- Tell them that they will play a game called "Spin the Wheel".

Teacher Facilitation

- Display a spinner on the overhead projector. (Teacher Resource 7).
- Introduce probability vocabulary by asking the students to look at the spinner and tell on which coin they think it will land. Have them explain

their answers. Ask them if they think it will land on a half-dollar and explain why or why not. *(Hopefully the students will notice that it is impossible to land on a half-dollar because it is not on the spinner)*. Question the students about it being more likely, less likely or equally likely to land on a certain coin.

- Review the names and values of the coins on the spinner. (Quarter, dime, nickel and penny).
- Tell the students they will be working in groups of four and taking turns to spin.
- Select jobs for each group member (materials manager, money manager, recorder and reporter). The materials manager will get the supplies and be responsible for them until they are returned. The money manager will put the money under the proper category on the placemat (Student Resource 7). The recorder will record tally marks for each spin on tally chart template (Student Resource 1). The reporter will report their results to the class.
- Count on after each spin to see if they reach $1.00.
- Students will top when their group reaches at least $1.00.
- They will raise their hands when their group is finished.

Student Application

- Students will predict how many spins it will take for their group to get to $1.00.
- Students will determine the least amount of spins it will take if they are really lucky.
- Separate students into assigned groups.
- Have students get the needed supplies.
- Students will spin the spinner as many times as needed.
- Students will record results.

Embedded Assessment

- While the students are playing "Spin the Wheel", the teacher will observe the students. *(Discuss with the students that you will be looking for how they record the data and use correct probability vocabulary.)*

Reteaching/Extension

- Students record their findings on a bar graph to reinforce graphing skills learned.

Summative Assessment:

The students will complete a written assessment that includes 5 selected responses and 1 brief constructed response (Student Resource 6). Answer key is on Teacher Resource 8.

Authors:

Terry Blume
Ridgeway Elementary School
Anne Arundel County

Charmaine Schmidt
The Empowerment Academy
Baltimore City

K - W - L

What we KNOW	What we WANT to know	What we LEARNED

Tally Chart

Category	Tallies	Total number

Tally Chart

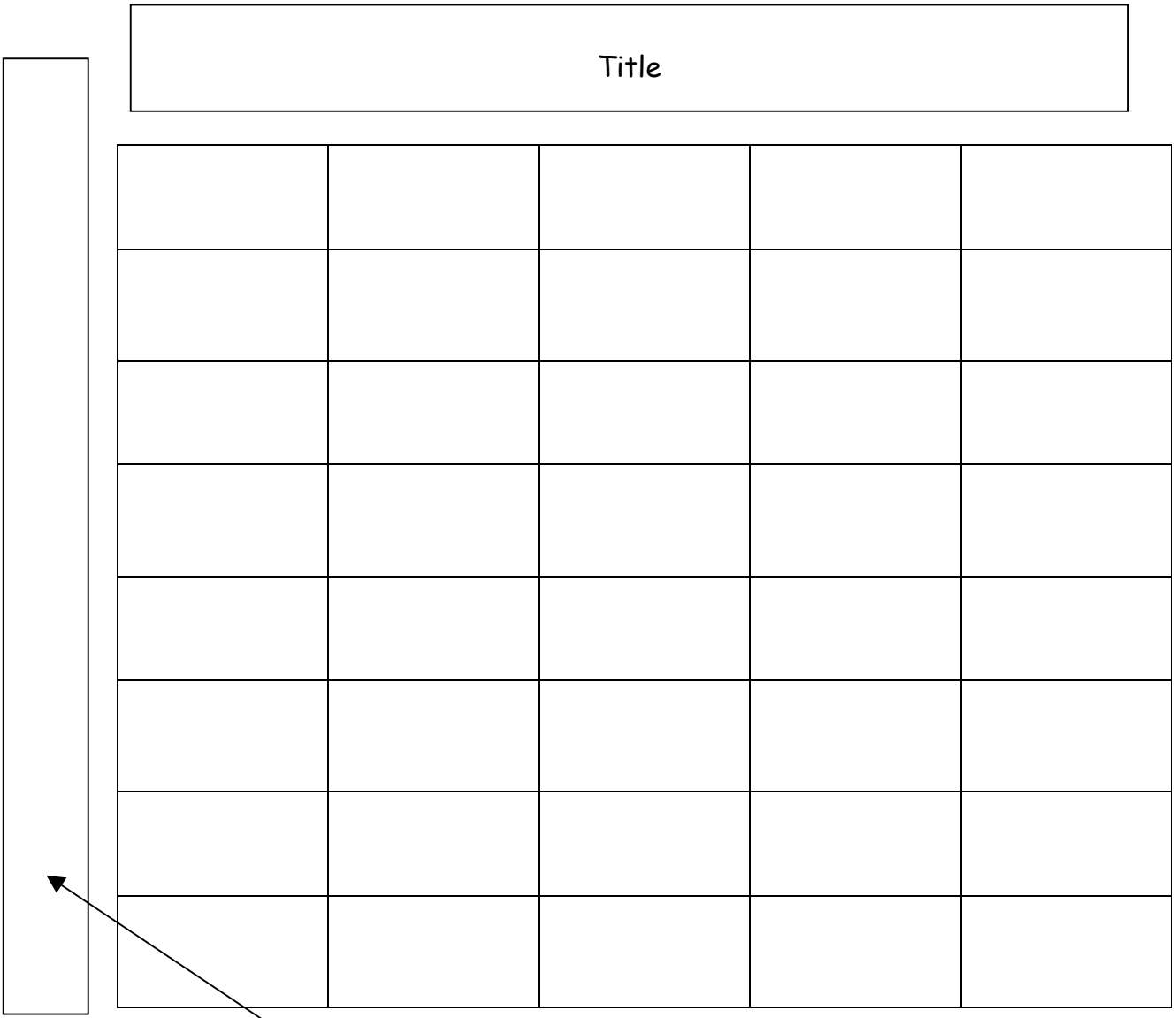
Coin Sort

Category	Tallies	Total number
Quarters	II	2
Dimes	III	3
Nickels	IIII	4
Pennies	~~IIII~~	5

Teacher Resource 4

Name_____Date_____

Cut out the vocabulary words from the bottoms and place them where they belong on the grid.



Horizontal axis

Categories

Add

Scale

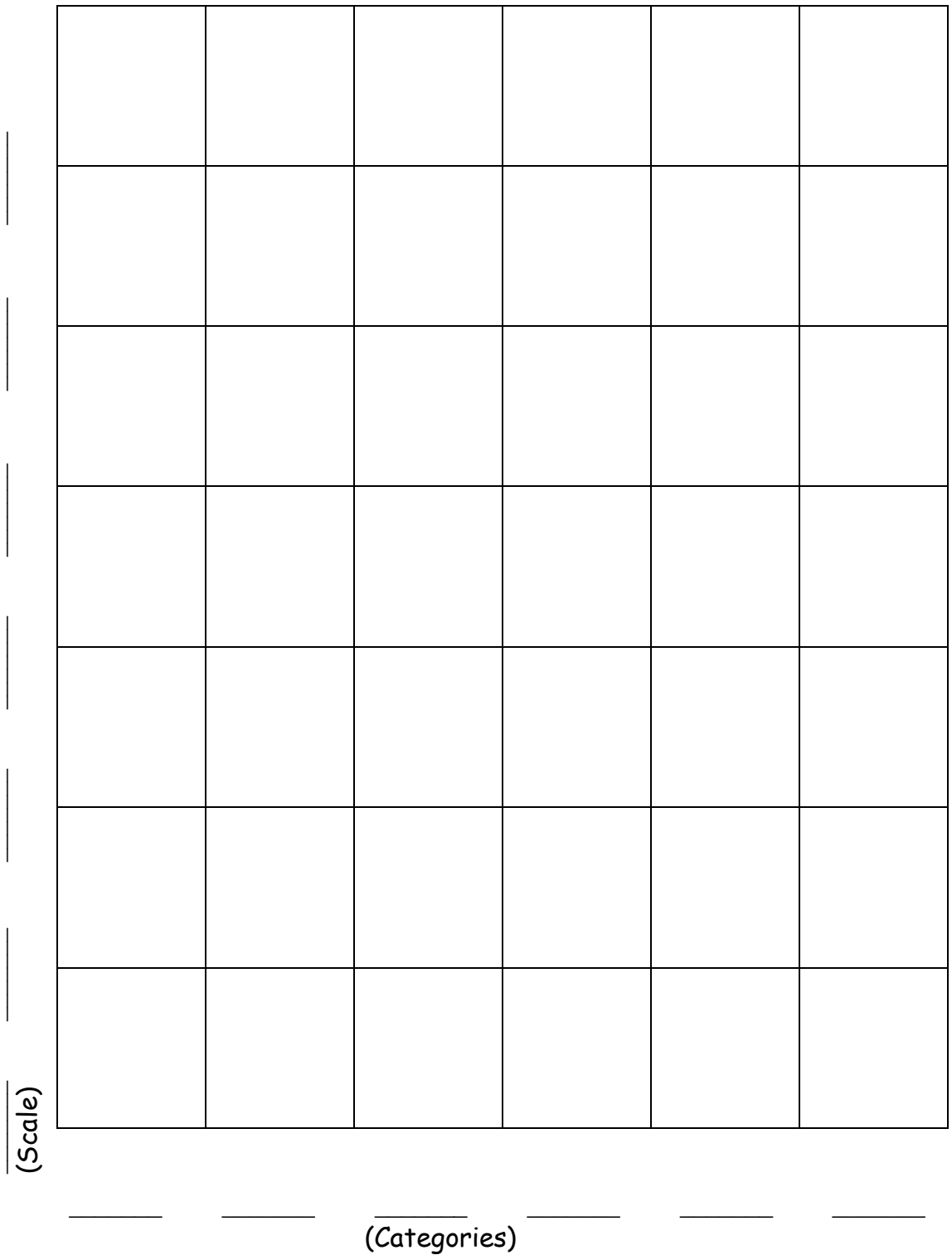
This is only a add-in; should not be used

Data

If student added in the middle, this student is advanced if not added at all do not penalize.

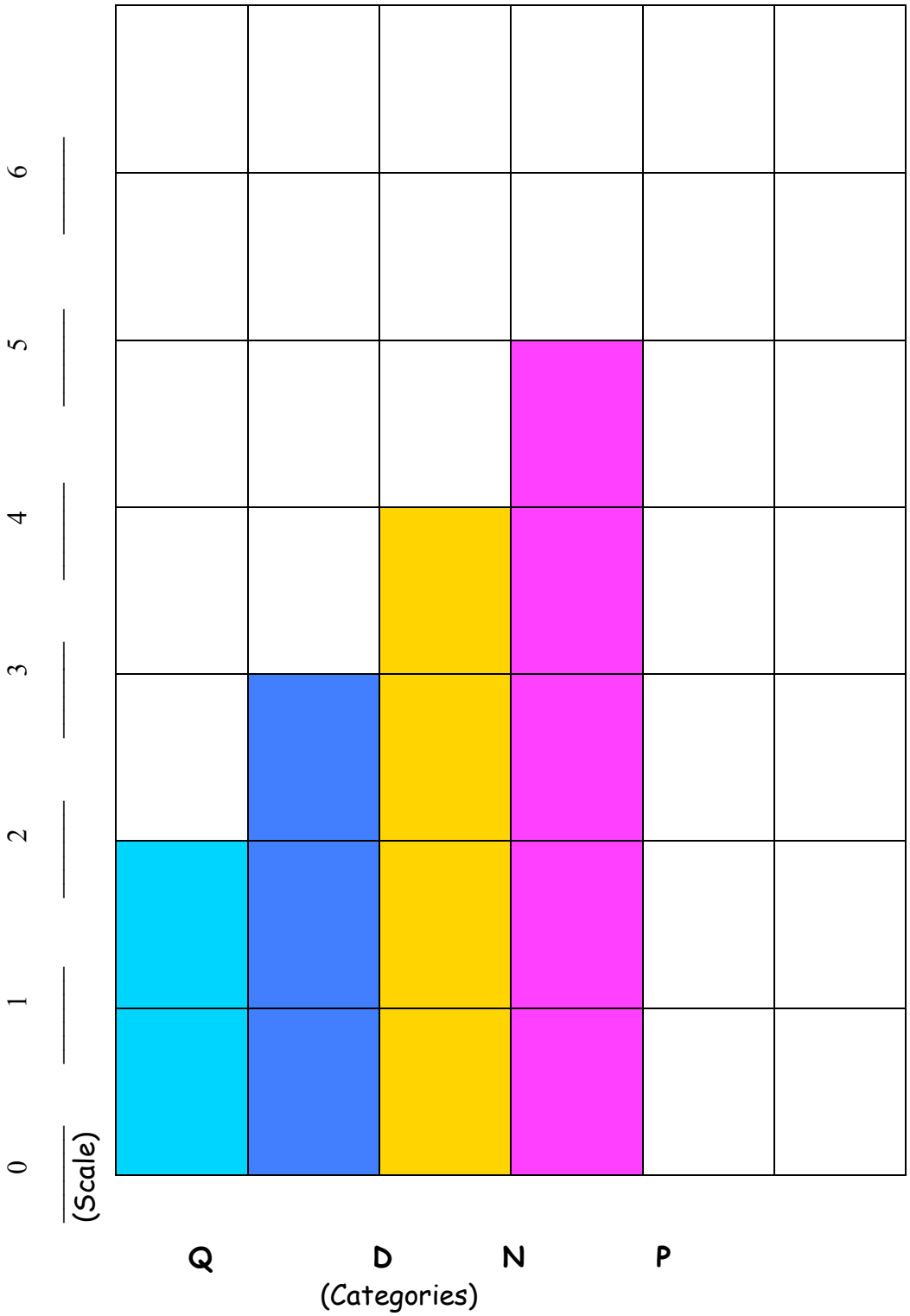
Bar Graph Worksheet

_____ (Title)



Bar Graph Worksheet

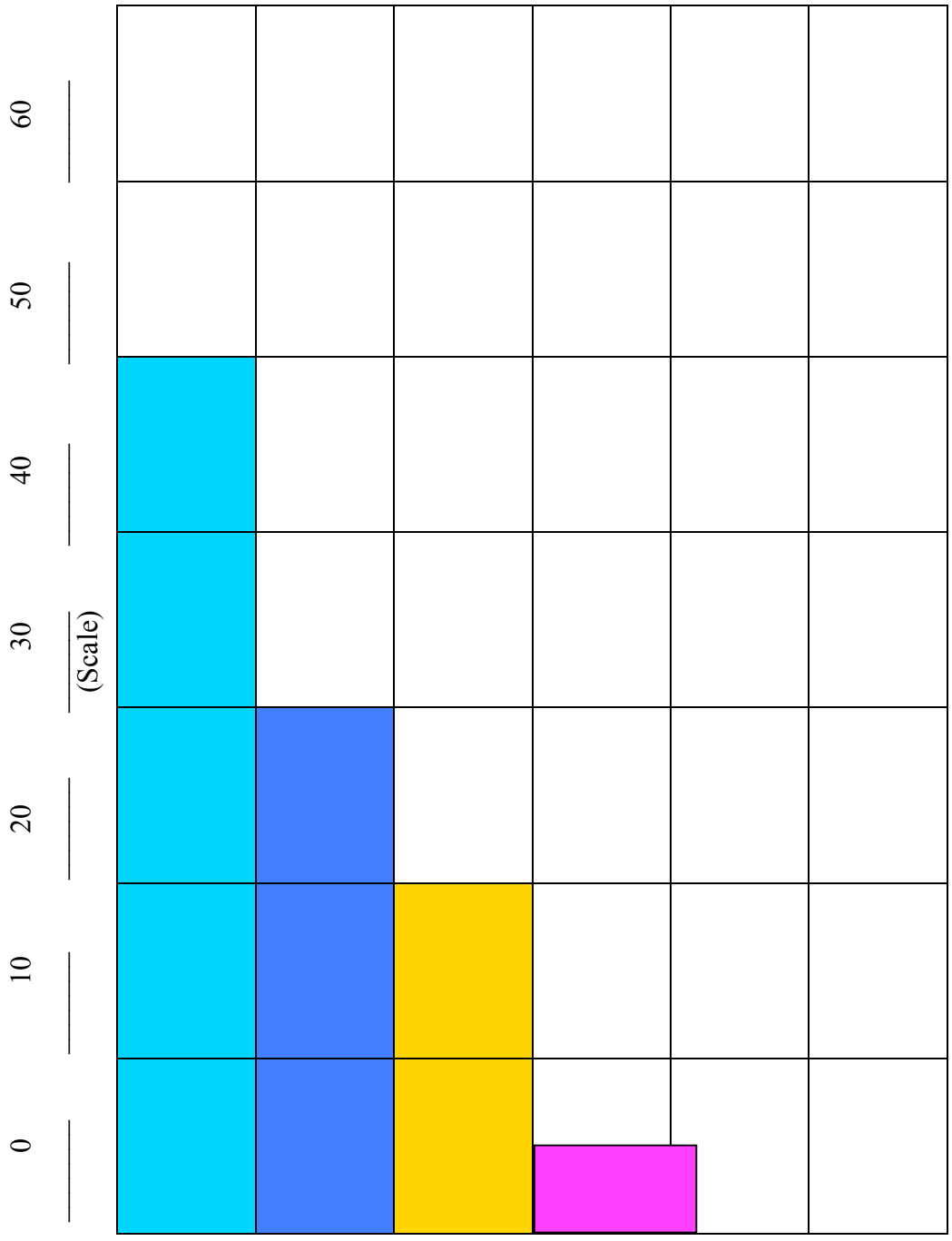
Coin Sort



Teacher Resource 6

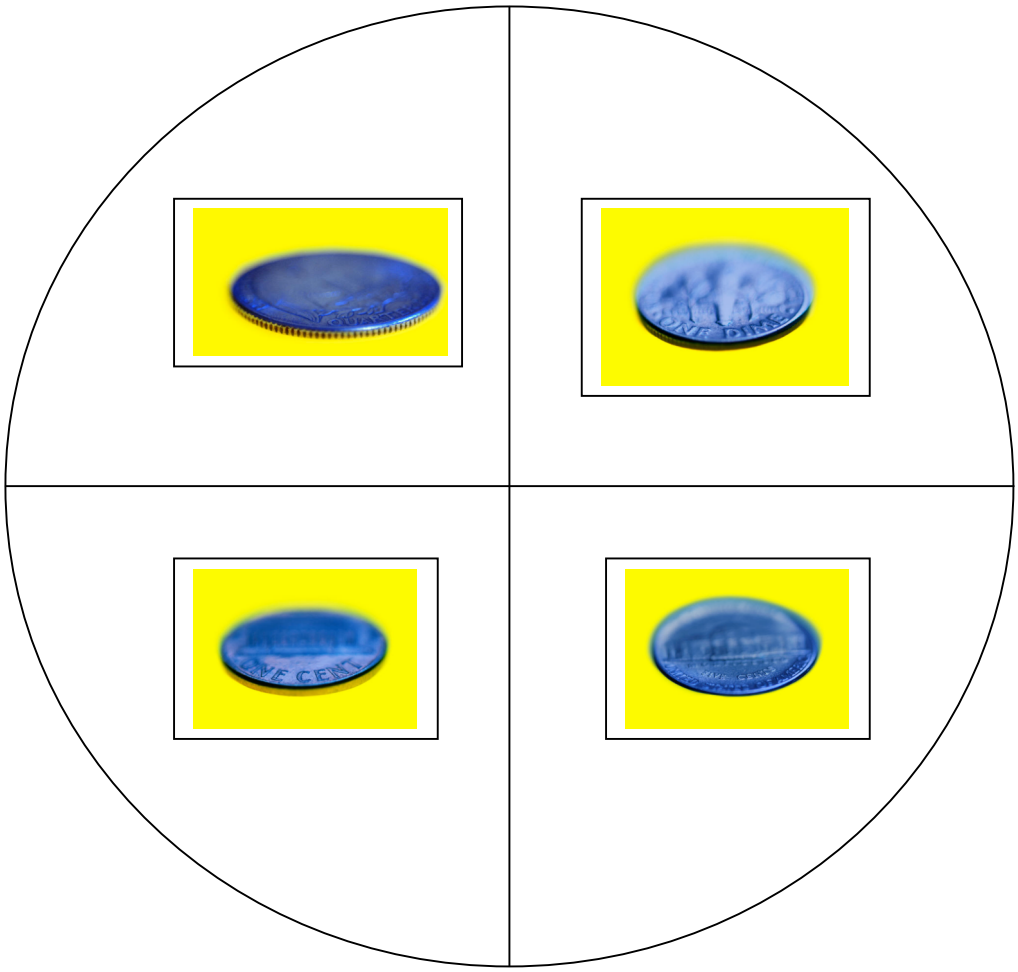
Bar Graph Worksheet

<u>Coin Amount</u> (title)



Unknown **Lou** **Bates** **Hiram C** _____ _____

(Categories)

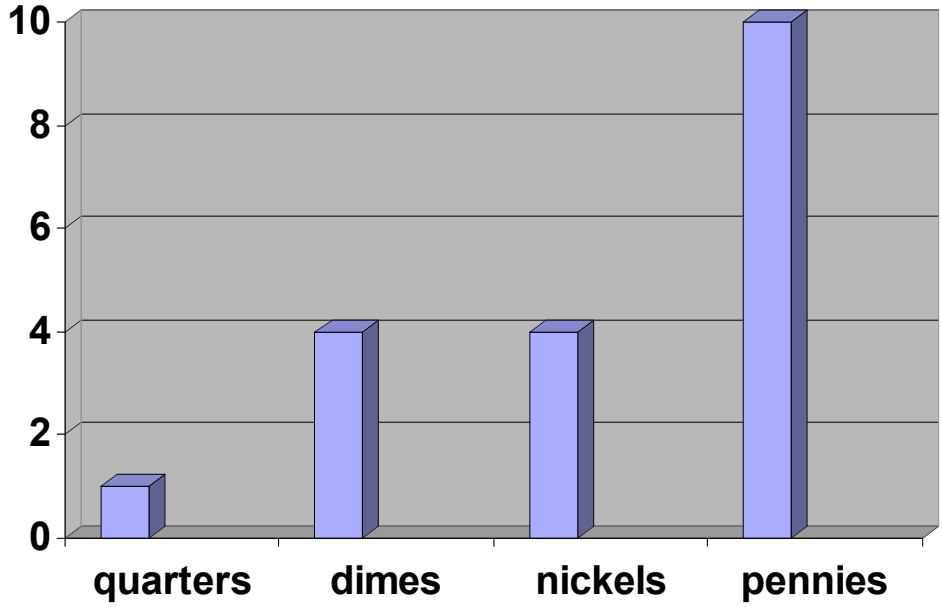

ONE DIME
ONE CENT

Name_____ Date _____

Statistics and Probability Assessment

Shantel counted the coins in her piggy bank to see how much money she had saved. She decided to graph the amount of coins she had. Use the bar graph below to answer the following questions.

Shantel's Coins



Coins

1. On what part of the bar graph did Shantel list the coins that she counted?

   O title O horizontal axis

   X scale O addend

2. Which coin did Shantel have the most of?

   X pennies O nickels

   O dimes O quarters

3. Which coins did she have an equal amount of?
   - O pennies and nickels
   - O dimes and quarters
   - O pennies and quarters
   - X nickels and dimes

4. Shantel counted the total amount for each group of coins. Which coins had the highest value?
   - O pennies
   - O nickels
   - X dimes
   - O quarters

5. What was the difference in the number of quarters and pennies?
   - O 3
   - X 9
   - O 11
   - O 10

Name _____ Date _____

Brief Constructed Response

Shantel put her 19 coins in a paper bag. She decided to pick one coin out her bag without looking to give to her baby sister for her birthday. Use the coins from the graph on first page.

Part A
Which coin is she more likely to choose?
Pennies (1 point)__

Part B
Use what you know about probability to explain how you determined your answer. Use words, pictures and/or numbers to support your explanation.

Probability is the likelihood of an event to take place. My answer is correct because there are more pennies than any other coins. (This answer is a 2 because it states the content and gives an appropriate reason for their answer. An answer with one of the answers receives a 1-point. An unrelated answer receives a zero.)

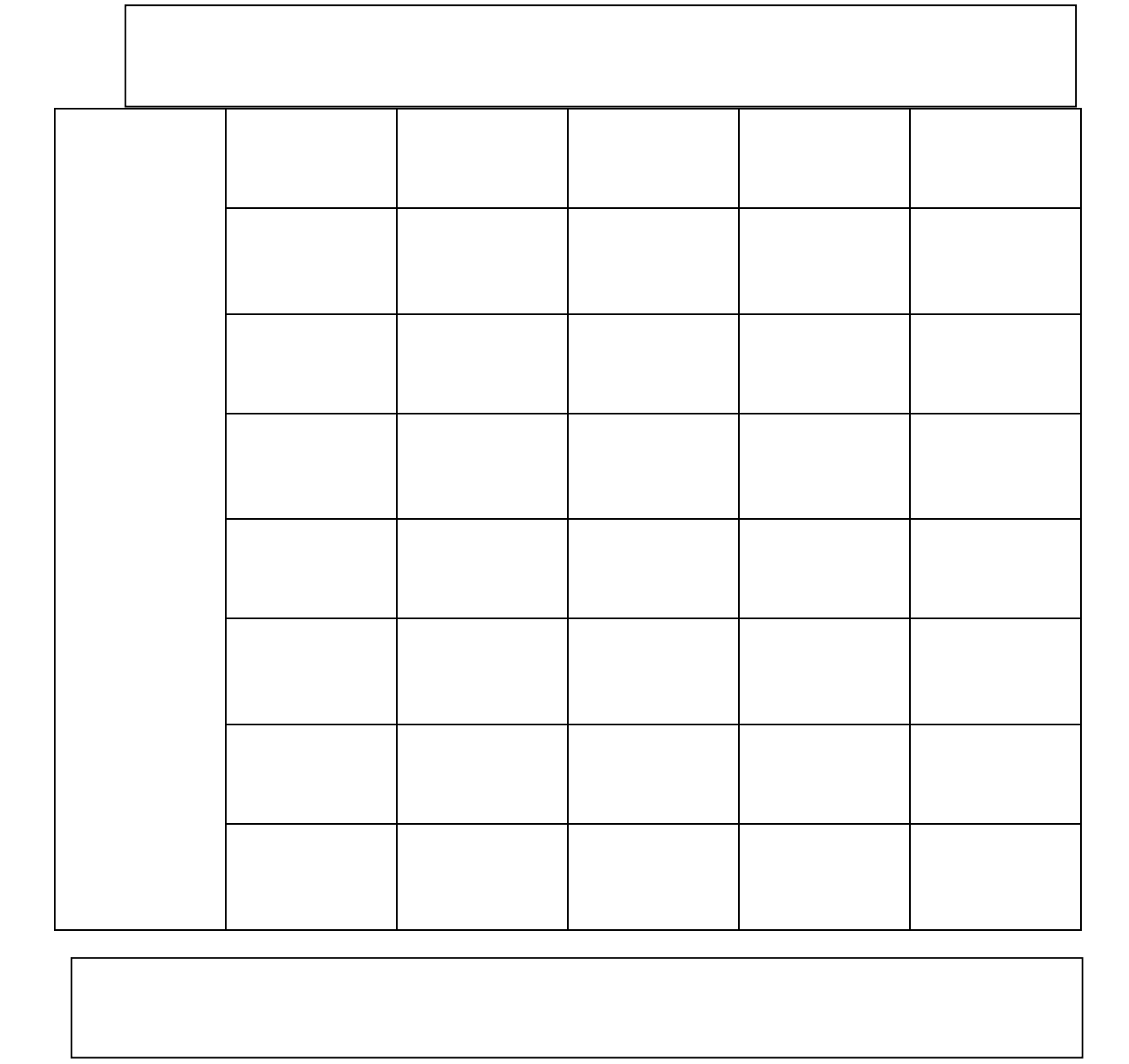
Tally Chart

Category	Tallies	Total number

Student Resource 2

Name_____Date_____

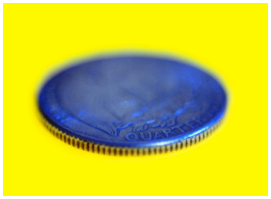
Cut out the vocabulary words from the bottoms and place them where they belong on the grid.

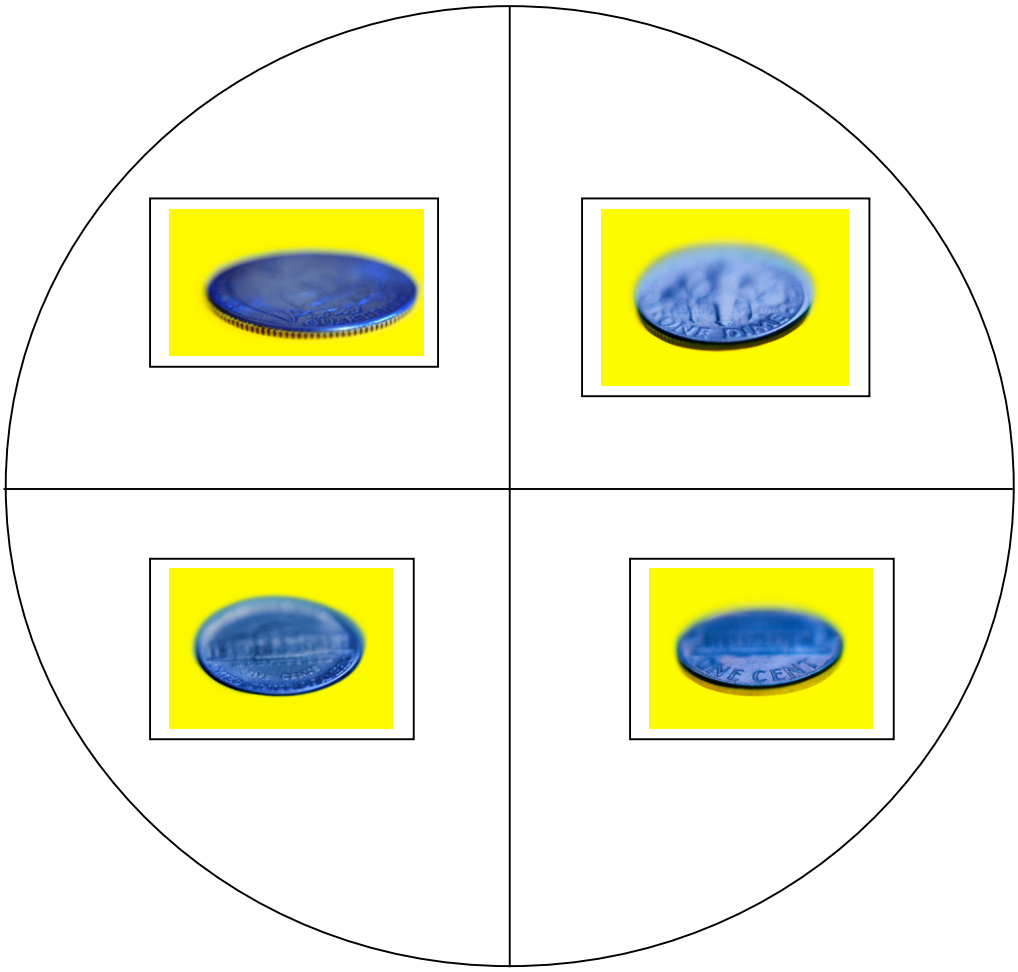


Horizontal axis	Categories	Scale	Vertical Axis

Title	Add	Data

Student Resource 3

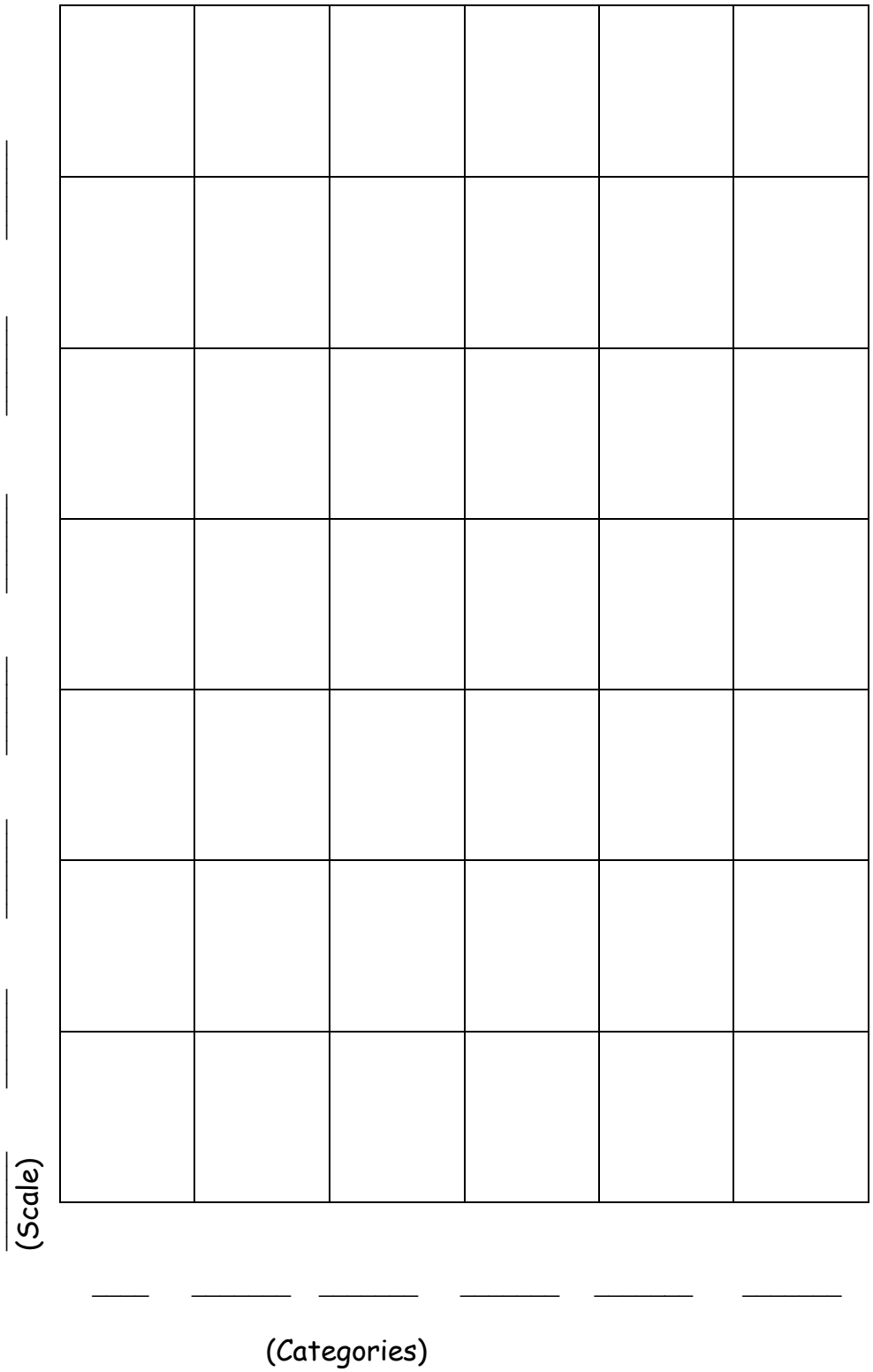
Quarters	Dimes	Nickels	Pennies
			



Student Resource 5

Bar Graph Worksheet

_____ (Title)

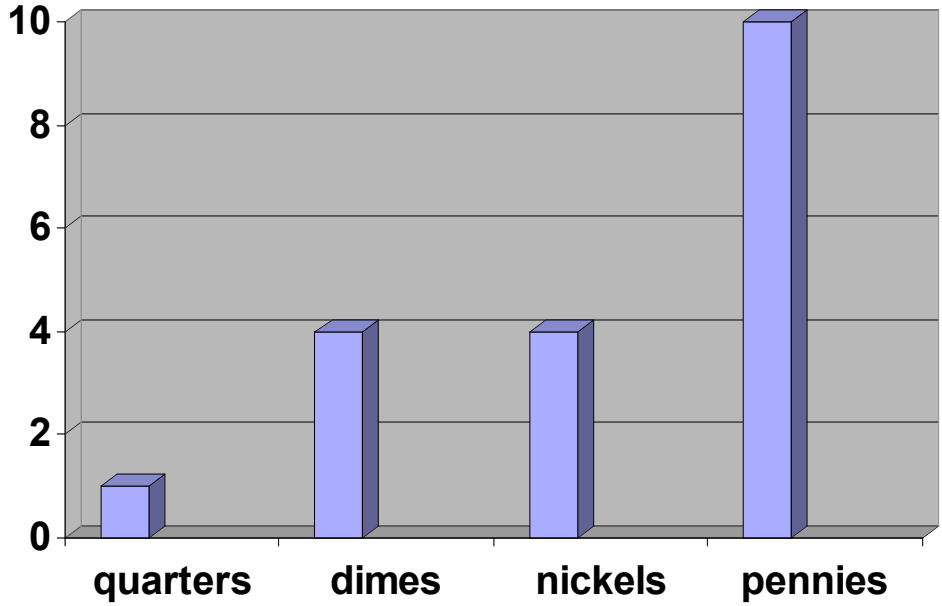


Name_____ Date _____

Statistics and Probability Assessment

Shantel counted the coins in her piggy bank to see how much money she had saved. She decided to graph the amount of coins she had. Use the bar graph below to answer the following questions.

Shantel's Coins



Coins

1. On what part of the bar graph did Shantel list the coins that she counted?
   - O title
   - O horizontal axis
   - O scale
   - O addend
2. Which coin did Shantel have the most of?
   - O pennies
   - O nickels
   - O dimes
   - O quarters

3. Which coins did she have an equal amount of?
   - O pennies and nickels
   - O dimes and quarters
   - O pennies and quarters
   - O nickels and dimes

4. Shantel counted the total amount for each group of coins. Which coins had the highest value?
   - O pennies
   - O nickels
   - O dimes
   - O quarters

5. What was the difference in the number of quarters and pennies?
   - O 3
   - O 9
   - O 11
   - O 10

Name _____ Date _____

Brief Constructed Response

Shantel put her 19 coins in a paper bag. She decided to pick one coin out her bag without looking to give to her baby sister for her birthday.

Part A

Which coin is she more likely to choose?

_____

Part B

Use what you know about probability to explain how you determined your answer. Use words, pictures and/or numbers to support your explanation.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____